

**Translation**

PATENT COOPERATION TREATY

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

01 FEB 2005

PCT/JP2003/009737



Applicant's or agent's file reference <b>03P091HEWO00</b>	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416	
International application No. <b>PCT/JP2003/009737</b>	International filing date (day/month/year) <b>31 July 2003 (31.07.2003)</b>	Priority date (day/month/year) <b>01 August 2002 (01.08.2002)</b>
International Patent Classification (IPC) or national classification and IPC <b>C23C 10/30, 8/24, B22C 9/06, B22D 21/00</b>		
Applicant <b>HONDA GIKEN KOGYO KABUSHIKI KAISHA</b>		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

a. ☒ (sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:

☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) \_\_\_\_\_, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒ Box No. I Basis of the report

☐ Box No. II Priority

☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

☐ Box No. IV Lack of unity of invention

☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

☐ Box No. VI Certain documents cited

☐ Box No. VII Certain defects in the international application

☐ Box No. VIII Certain observations on the international application

Date of submission of the demand <b>20 February 2004 (20.02.2004)</b>	Date of completion of this report <b>01 December 2004 (01.12.2004)</b>
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2003/009737

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_, which is language of a translation furnished for the purpose of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☐ The international application as originally filed/furnished
- ☒ the description:
- pages \_\_\_\_\_ 1-22 \_\_\_\_\_, as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the claims:
- pages \_\_\_\_\_ 15, 16 \_\_\_\_\_, as originally filed/furnished
- pages\* \_\_\_\_\_ 1, 3, 4, 7-9, 11-14, 17-23 \_\_\_\_\_, as amended (together with any statement) under Article 19
- pages\* \_\_\_\_\_ 2 \_\_\_\_\_ received by this Authority on \_\_\_\_\_ 26 July 2004 (26.07.2004)
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the drawings:
- pages \_\_\_\_\_ 1-15 \_\_\_\_\_, as originally filed/furnished
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☒ the claims, Nos. \_\_\_\_\_ 5, 6, 10 \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP03/09737

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

## 1. Statement

Novelty (N)	Claims	1, 3, 4, 7-9, 11-16, 18-23	YES
	Claims	2, 17	NO
Inventive step (IS)	Claims	7, 8, 12, 13, 15, 16, 19-23	YES
	Claims	1-4, 9, 11, 14, 17, 18	NO
Industrial applicability (IA)	Claims	1-4, 7-9, 11-23	YES
	Claims		NO

## 2. Citations and explanations (Rule 70.7)

Document 1: JP, 52-115749, A (Nippon Steel Corp.), 28 September, 1977 (28.09.77)  
 Document 2: JP, 58-174566, A (Okabe Kinzoku Kagaku Kogyo K.K.), 13 October, 1983 (13.10.83)  
 Document 3: EP, 863223, A1 (Citizen Watch Co., Ltd.), 9 September, 1998 (09.09.98)  
 Document 4: JP, 8-13128, A (Nisshin Steel Co., Ltd.), 16 January, 1996 (16.01.96)  
 Document 5: JP, 5-65567, A (Hitachi Cable, Ltd.), 19 March, 1993 (19.03.93)

The subject matter of claim 1 does not appear to involve an inventive step in view of documents 1 and 2 cited in the ISR.

The subject matter of claim 2 does not appear to be novel or to involve an inventive step, since it is described in document 1 cited in the ISR.

The subject matter of claim 3 does not appear to involve an inventive step in view of documents 1 and 3 cited in the ISR.

The subject matter of claim 4 does not appear to involve an inventive step in view of documents 1 and 4 cited in the ISR.

The subject matters of claims 7 and 8 are neither described in any of the documents cited in the ISR nor obvious to a person skilled in the art.

The subject matters of claims 9 and 11 do not appear to involve an inventive step in view of documents 1 and 5 cited in the ISR.

The subject matters of claims 12 and 13 are neither described in any of the documents cited in the ISR nor obvious to a person skilled in the art.

The subject matter of claim 14 does not appear to involve an inventive step in view of documents 1 and 5 cited in the ISR.

The subject matters of claims 15 and 16 are neither described in any of the documents cited in the ISR nor obvious to a person skilled in the art.

The subject matter of claim 17 does not appear to be novel or to involve an inventive step, since it is described in document 1 cited in the ISR.

The subject matter of claim 18 does not appear to involve an inventive step in view of documents 1 and 3 cited in the ISR.

The subject matters of claims 19-23 are neither described in any of the documents cited in the ISR nor obvious to a person skilled in the art.

CLAIMS

ART 34 AMDT

1. (Amended) A metal material comprising a diffusion  
layer containing a Cu-Zn alloy or a Cu-Mn alloy formed by  
diffusing at least any one of Cu and Mn in a base material  
of a Zn alloy,

wherein said Cu or Mn is diffused from a surface to  
inside of said base material to a depth of not less than 0.5  
mm; and

a concentration of said Cu or Mn is gradually decreased  
from said surface to said inside of said base material.

2. (Amended) A metal material comprising a diffusion  
layer containing a Fe-Cr alloy formed by diffusing Cr in a  
base material of a Fe alloy, chromium carbonitride being  
produced on a surface of said base material,

wherein said Cr is diffused from said surface to inside  
of said base material to a depth of not less than 0.5 mm;  
and

a concentration of said Cr is gradually decreased from  
said surface to said inside of said base material.

3. (Amended) A metal material comprising a diffusion  
layer containing a Ti-Al alloy, a Ti-Cr alloy, a Ti-Ni alloy  
or TiN formed by diffusing at least any one of Al, Cr, Ni  
and N in a base material of a Ti alloy, a nitride of any one  
of Al, Cr and Ni being produced on a surface of said base

material,

wherein said any one of Al, Cr, Ni and N is diffused from said surface to inside of said base material to a depth of not less than 0.5 mm; and

5 a concentration of said any one of Al, Cr, Ni and N is gradually decreased from said surface to said inside of said base material.

10 4. (Amended) A metal material comprising a diffusion layer containing a Cu-Ni alloy formed by diffusing Ni in a base material of a Cu alloy,

wherein said Ni is diffused from a surface to inside of said base material to a depth of not less than 0.5 mm; and

15 a concentration of said Ni is gradually decreased from said surface to said inside of said base material.

5. (Canceled)

6. (Canceled)

20 7. (Amended) The metal material according to claim 1, wherein said diffusion layer further contains at least one of iron, nickel, chromium, molybdenum, cobalt, and ceramics.

25 8. (Amended) The metal material according to claim 1, further comprising an Fe alloy layer disposed on a surface of said diffusion layer.

9. (Amended) A method of producing a metal material comprising a diffusion layer which is formed by diffusing an element into a base material of a metal and which has a depth from a surface of said base material of not less than 0.5 mm, a concentration of said element being gradually decreased from said surface to inside of said base material, said method comprising:

coating said surface of said base material with a coating agent, said coating agent including a powder of a substance containing said element to be diffused, said coating agent further including a reducing agent for reducing an oxide film formed on said surface of said base material, and said powder of said substance and said reducing agent being dispersed or dissolved in a solvent; and

diffusing said element into said base material by heating said base material which is coated with said substance.

10. (Canceled)

11. (Amended) The method of producing said metal material according to claim 9, wherein said base material comprises a Zn alloy, and wherein each of resins of nitrocellulose, polyvinyl alcohol, polyvinyl, acrylic, melamine, styrene, and phenol is used as said reducing

ATT 3/1/2007

agent.

12. (Amended) The method of producing said metal material according to claim 11, wherein said base material is further coated with at least one metal powder of magnesium, aluminum, or manganese, or at least one alloy powder of a magnesium alloy, an aluminum alloy, and a manganese alloy.

13. (Amended) The method of producing said metal material according to any one of claims 9, 11 and 12, wherein said base material is heated such that a temperature gradient is formed in said diffusing step.

14. (Amended) The method of producing said metal material according to any one of claims 9, 11, 12 and 13, wherein said diffusing step is carried out in an inert gas atmosphere.

15. The method of producing said metal material according to claim 9, wherein a Zn alloy is used as said base material, at least a part of said base material is coated with a first powder containing at least any one of copper and manganese, and then the base material is coated with a second powder containing Fe in said diffusing step.

16. The method of producing said metal material

according to claim 12, wherein at least one selected from Ni, Sn, Cu, and the like is further added.

17. (Amended) A method of producing a metal material comprising a diffusion layer which contains an Fe-Cr alloy formed by diffusing Cr into a base material of an Fe alloy and which has a depth from a surface of said base material of not less than 0.5 mm, a concentration of said Cr being gradually decreased from said surface to inside of said base material, said method comprising:

coating said surface of said base material with a coating agent, said coating agent including a mixed powder of Cr, Mo, Ni, C and BN, and said powder being dispersed or dissolved in a solvent; and

diffusing said element into said base material by heating said base material which is coated with said substances.

18. (Amended) A method of producing a metal material comprising a diffusion layer which contains a Ti-Al alloy, a Ti-Cr alloy, a Ti-Ni alloy or TiN formed by diffusing at least any one of Al, Cr, Ni and N into a base material of a Ti alloy and which has a depth from a surface of said base material of not less than 0.5 mm, a concentration of at least any one of Al, Cr, Ni and N being gradually decreased from said surface to inside of said base material, said method comprising:



ART 34 AMEND

coating said surface of said base material with a coating agent, said coating agent including a mixed powder of Al, Cr, Ni, C and BN, and said powder being dispersed or dissolved in a solvent; and

5 diffusing said element into said base material by heating said base material which is coated with said substances.

10 19. (Amended) A method of producing a metal material comprising a diffusion layer which is formed by diffusing an element into a base material of a metal and which has a depth from a surface of said base material of not less than 0.5 mm, a concentration of said element being gradually decreased from said surface to inside of said base material,  
15 said method comprising:

adding at least one of copper and manganese as a seeding agent to a molten metal when casting is performed by using said molten metal of Zn or a Zn alloy.

20 20. (Amended) The method of producing said metal material according to claim 19, wherein it takes 10 to 30 seconds to start said casting after said seeding agent is added to said molten metal.

25 21. (Amended) The method of producing said metal material according to claim 19 or 20, wherein said Cu or said Mn is a powder having a particle size of 10  $\mu$ m to 50

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µm.

22. (Amended) The method of producing said metal material according to claim 19, wherein said Cu is seeded in an amount of 1 % by weight to 18 % by weight of an entire amount of said Zn or said Zn alloy.

23. (New) The method of producing said metal material according to claim 19, wherein said Mn is seeded in an amount of 3 % by weight to 30 % by weight of said seeding agent.

REPLACED BY  
ART 34 AMDT

Explanatory note based on the provision of Article 19(1) of  
PCT

Amended claims 1 to 4 clearly specify metals of base  
5 materials and metals diffused into the base materials. The  
steps of diffusing a metal into each base material which  
comprises a Zn alloy, an Fe alloy or a Ti alloy are  
described in the description: from line 11 of page 8 to line  
9 of page 11, line 12 of page 9 to line 7 of page 12, and  
10 from line 8 of page 12 to line 20 of page 13 in detail,  
respectively.

Claim 9 is amended by incorporating the technical  
features of the original claim 10 into the original claim 9,  
to clearly state that a reducing agent is included into a  
15 coating agent.

Further, amended claims 17 and 18 specify the metal of  
the base material in the original claim 9 and the metals  
diffused into the base material. As described above, the  
steps of diffusing metals into each base material which  
20 comprises an Fe alloy or a Ti alloy are explained in the  
description: from line 12 of page 9 to line 7 of page 12,  
and from line 8 of page 12 to line 20 of page 13.

Since claims 17 and 18 are amended, original claims 17  
to 22 are renumbered from claim 19. Since the features of  
25 the original claims 19 and 20 were substantially same, claim  
21 is amended to state the features of original claims 19  
and 20.

ART 3.1.1.1.1

Claim 2 is currently amended to correct an obvious error. That is, it is self-evident that an Fe-Cr alloy, not a Cu-Cr alloy, is produced by diffusing Cr into an Fe alloy. In addition, amended claim 2 is consistent with claim 17.

5 As described above, claim 2 is amended to correct an error that even a person who is not skilled in the art can easily recognize as a clerical one.

10 According to the Box No. V of the Written Opinion, claims 19 to 23 are approved to be novel and involve an inventive step in "1. Statement". However, in "2. Citations and explanations", it is stated that the invention according to claims 19 to 23 is not novel and lacks an inventive step as being disclosed in the reference D1 cited in the International Search Report.

15 Further, it is clear that the invention in claims 12 and 13 is admitted to involve an inventive step according to the upper row of "Inventive step" in "1. Statement", and "2. Citations and explanations". However, in the lower row of the "Inventive Step" of "1. Statement", it seems to be  
20 stated that the invention according to claims 11 to 14 lacks an inventive step, although this includes the invention in claims 12 and 13. Such description might lead to a misunderstanding that claims 12 and 13 are lack of inventive step.

25 As described above, there are some contradictions between "1. Statement" and "2. Citations and explanations" in the Box No. V of the Written Opinion. It is requested

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Arguments filed together with amended claim under Article  
34

2

that the contradictions should be resolved.

ART 34 AMDT